MU123

TMA 01   2019B

Covers Units 1 and 2   **Cut-off date   12 March 2019**

Submission instructions

You will find instructions for completing TMAs in the 'Assessment' area of the MU123 website. Please read these instructions before beginning work on this TMA.

Special instructions

Question 5 asks you to think about the communication of your mathematics throughout this TMA. You might find it helpful to read this question first so that you can bear it in mind as you work through the other questions.

TMA 01   **Cut-off date** 12 March 2019

Question 1   –   10 marks

This question is based on your work on MU123 up to and including Unit 1, concentrating on good mathematical communication (GMC).

Consider the following TMA question:

> The Shard in London is the tallest building in the United Kingdom. It is 306 m tall, which is the equivalent of 70 London buses stacked one on top of another. Find the height of one London bus, in metres, giving your answer to one decimal place.

Here is a student's attempt at a solution, with the correct numerical result:

$$306 = 306/70 = 4.4 = \text{height}$$

(a) With reference to good mathematical communication (GMC), describe three aspects of the student's solution that could be improved.   [6]

(b) Write out your own solution to this question.   [4]

You will find pages 54–8 of Book A useful.

Question 2   –   30 marks

This question is based on your work on MU123 up to and including Unit 1.

(a) A recipe for macaroni cheese for 4 people uses 250 g of macaroni. Calculate the quantity of macaroni needed for 10 people.   [5]

(b) A swimming club has 65 members, and 18 of these are aged over 50. Calculate the percentage of swimming club members who are aged over 50. Give your answer correct to the nearest whole number.   [5]

(c) There are 350 children enrolled in a school. On the first Monday in March, 96% of the children were present.

   (i)   Calculate the number of children who were present on this day.   [3]

   (ii) Write the number of children who were present as a fraction of the total number of children in the school. Give your answer in its simplest form.   [2]

(d) (i)   A town has a population of 15 500. The population is forecast to rise by 3% over the next year. Calculate the new population after the 3% rise, giving your answer correct to three significant figures.   [5]

   (ii) The following year, the population is forecast to rise by 1%. Calculate the new population after this 1% rise, giving your answer correct to three significant figures.   [5]

(e) An amateur meteorologist working in central England found that the local rainfall was 102.4 mm in November 2016 and 76.9 mm in November 2017. Calculate the percentage decrease in rainfall between November 2016 and November 2017, giving your answer correct to one decimal place.   [5]

Question 3 – 20 marks

This question is based on your work on MU123 up to and including Unit 2.

(a) Alex is planning to walk the Cleveland Way in Yorkshire during the summer. On the first day he will walk from Helmsley to Sutton Bank. The distance is 16 km, and Alex estimates that this stage of the walk will take 3 hours 45 minutes. Find his average speed in km per hour for this stage of the walk, giving your answer correct to two significant figures. [5]

(b) The next stage of the walk, from Sutton Bank to Osmotherley, is 19.2 km. If Alex walks at the same average speed, find how long this stage of the walk will take. Give your answer in hours and minutes. [5]

(c) The distance from Osmotherley to Clay Bank on a map with a scale of 1 : 25 000 is 70.9 cm. Find the corresponding distance on the ground (in km), giving your answer correct to three significant figures. [5]

(d) The distance of the section of the walk from Clay Bank to Kildale is 15.1 km, and the height ascended is 220 m. Use Naismith's Rule

$$T = \frac{D}{5} + \frac{H}{600},$$

where T is the time for the walk in hours, D is the horizontal distance walked in km, and H is the height climbed in metres, to estimate the time taken for this section of the walk. Give your answer correct to the nearest 10 minutes. [5]

Question 4 – 20 marks

This question is based on your work on MU123 up to and including Unit 2.

(a) The height of water in a tank falls steadily at a rate of 3 cm per hour. (You may assume that no other water enters or leaves the tank.)

   (i) Using this information, complete a copy of the table below.

Time t (hours)	0	5	10	20	25	35	50
Height H of water remaining (cm)	165	150	135				

   [2]

   (ii) Draw a graph to illustrate this information. The vertical axis should show H, the height of water remaining in the tank, and the horizontal axis should show t, the time in hours. Mark the points clearly and join them up with a line. You will find the tips for drawing graphs on page 84 of Unit 2 useful.
   You can draw your graph either by hand (using graph paper) or using a computer. [6]

   (iii) Explain how you could use your *graph* to find the time at which the height of water remaining is 70 cm. [2]

(b) A plasterer's rate (including materials) is £13.50 per m².

   (i) Calculate the total cost of plastering a room with an area of 30.2 m². [2]

   (ii) Write down a formula for the total cost C (in £) of plastering an area of A m². [2]

   (iii) Explain what the inequality $A \geq 0$ means in this practical context. [1]

(c) Find the value of

$$k = 4 - b^2 + ac$$

when $a = 0.25$, $b = -2.15$ and $c = -0.9$. Give your answer correct to two significant figures. [5]

Question 5 – 10 marks

This question concerns the important theme of **good mathematical communication (GMC)**.

Copy *both* sections of the form below, and complete Section (a). Your tutor will complete Section (b).

(a) (i)	Read over Subsection 5.3 of Unit 1. Write down two points about good mathematical communication that you have tried to put into practice in writing your answers in this TMA. [1]
(ii)	For each point that you mentioned in part (a)(i), give a specific example (e.g. Question 3(d)) from this TMA where you have put the point into practice. [1]
(b)	Your tutor will award up to eight marks for good mathematical communication in Questions 2, 3 and 4 of this TMA, and will comment on your mathematical communication below. ***Please leave at least half a page blank here for your tutor's comments.*** [8]

Question 6 – 10 marks

This question is about planning and completing your work for the next assignment.

You are encouraged to use the form on the next page for your answers to this question.

(a) Write down the cut-off date for MU123 TMA 02.   [1]

(b) Describe one factor that will affect how you plan your work on MU123 between now and the cut-off date for TMA 02. How do you intend to take this factor into account?

   For example, this could include other commitments, such as family or work, or factors resulting from your work on TMA 01 or iCMA 41.   [3]

(c) TMA 02 covers work from Unit 3, Numbers, Unit 4, Statistical summaries, and Unit 5, Algebra. Look quickly through these units so that you get an idea of what to expect.

   Which of the following statements apply to you? You can choose one or more.

   A: I am fairly confident that I can complete the TMA on time.

   B: I am concerned that I may not have enough time to complete the TMA on time.

   C: I am concerned that I may not be able to cope with some of the maths in Units 3, 4 and 5.

   D: None of the three statements A, B and C applies to me.   [1]

(d) Write a brief explanation of your choice of options in part (c).   [2]

(e) Write down a change that you have made, or plan to make, to your studying as a result of working through this TMA, and explain how this will help you to make your studying more effective. (If you think that no changes are necessary, then explain why.)

   For example, this could include creating a study plan, attending tutorials or doing TMA questions as you complete the relevant unit.   [3]

TMA 01   Question 6

(a)	The cut-off date for TMA 02 is:
(b)	One factor that will affect my work on MU123 over the next month. How I intend to take this factor into account.
(c)	My choice of option is: A ☐ B ☐ C ☐ D ☐
(d)	My reasons for choosing the option(s) in part (c).
(e)	A change that I have made or plan to make for more effective studying, and why.